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BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XL**1908.****No. 10**

THE CLIMATE OF ANCIENT PALESTINE, PART II.*

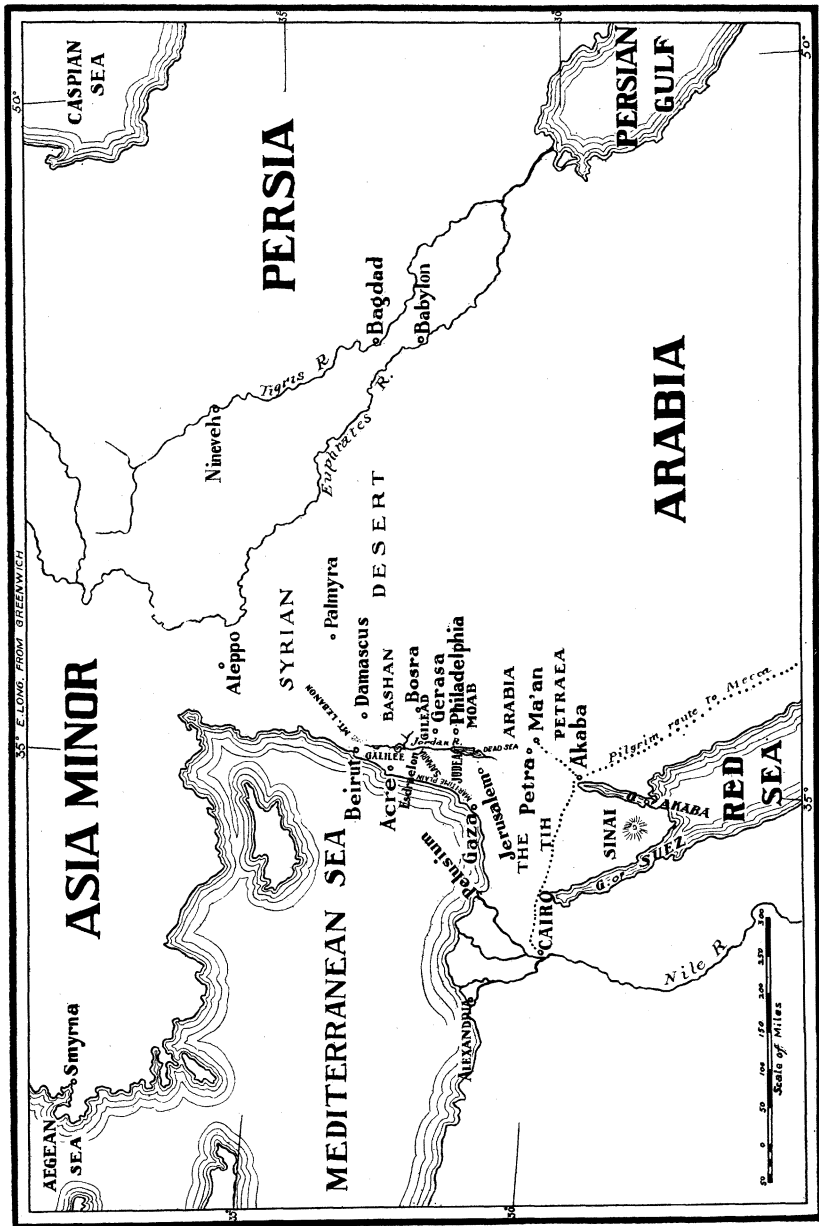
BY

ELLSWORTH HUNTINGTON.

TYPES OF EVIDENCE AS TO CHANGES OF CLIMATE.—In the long discussion which has been carried on over the climate of Palestine, many lines of evidence have been brought forward. Three of these have already been referred to as inconclusive, because of the impossibility of distinguishing between the work of man and that of nature, and because human modes of expression are so variable. They may be stated as follows: (1) Biblical and other statements as to meteorological phenomena in ancient times. (2) Statements as to the fertility of the soil. (3) Data as to the kinds of plants growing in Palestine in the past and at present. In the future these lines of evidence will doubtless furnish many important facts. At present research has only gone far enough to show that, while they are not positively inconsistent with the theory of climatic uniformity, they are more readily explicable on the theory of change. Further discussion of them may well be deferred. Certain other lines of evidence will also not be taken up in the present article, because, although the most important of all, they have not yet been made the subject of any investigation by trained observers in Palestine itself. Leaving out, then, the inconclusive and the unstudied lines of evidence, there remain four lines which make it possible to form some fair estimate of the validity of the four climatic hypotheses. These are: (1) The density of the population of Palestine at various periods. (2) The distribution of forests. (3) Ancient migrations, trade-routes and lines of invasion. (4) The distribution, location, and water supply of abandoned ruins.

(1) THE POPULATION OF ANCIENT PALESTINE.—One of the commonest arguments in favor of a change of climate is the former

* Part I, with Map of Syria, in BULLETIN for September, p. 513.



MAP OF SYRIA AND SURROUNDING COUNTRIES.

density of population. Taken by itself the argument is inconclusive, but combined with other lines of evidence it is important as will appear in the discussion of deforestation. In Deuteronomy the number of men able to bear arms who came into Palestine is said to have been 603,550, besides women and children. This would mean a total of between two and three million. In David's time the population, according to the census which he took, amounted to between five and six million. Most authorities agree with Hilderscheid, one of the strongest opponents of the theory of climatic change, who says that although these figures may be regarded as "in oriental fashion greatly exaggerated, yet it cannot be doubted that the population of that time was much more numerous and dense than it has now become; and since this population lived almost exclusively by agriculture and cattle-raising, the soil of Palestine must have given much more sustenance than in our day, when it scarcely supports about 600,000 people. That the productivity of the land has diminished notably since ancient times admits of no doubt; the question is, what causes have occasioned this diminution."

The fact of the diminution in the fertility and resources, and, consequently, in the population of Palestine is so patent and well known that it is unnecessary to dwell on it. Only two causes for this state of affairs have been seriously suggested, namely, changes of climate and human folly. Hilderscheid concludes his discussion of the subject thus: "We come to the conclusion that the present poor economic condition and the sparse population are not due to an actual change in natural conditions, but that the sad state in which the land is found at present has been brought about chiefly as the result of historic development; and certainly the hope may be cherished that by a fundamental change in the conditions occasioned by Turkish barbarism, the present barren and unproductive land may again in course of time be able to be brought to a state of culture and prosperity." Many pages have been devoted to the discussion of the possibility of thus restoring Palestine. Almost all writers on the country have something to say about the matter. There is so much opportunity for reasonable diversity of opinion, however, that the discussion is inconclusive, and must remain so, until some other criteria have been found by which it shall be possible to determine beyond question whether there have or have not been changes of climate. If there have been such changes, their influence must first be considered, and then the part played by human folly can be fairly estimated.

(2) DEFORESTATION.—Among the believers in climatic change a

large number attribute the supposed phenomenon to deforestation. They point to the frequent mention of forests in the Old Testament, a fact which certainly suggests a state of affairs quite different from that of to-day. For instance, when the Israelites entered Palestine they appear to have found the country well covered with forests which it was necessary to clear away before they could take possession of the land. In Joshua XVII: 14-18, we read that when the country was divided among the twelve tribes, Ephraim and Manasseh received the central part of the country, the region later known as Samaria. This extends about 40 miles eastward from the Mediterranean Sea to the Jordan River, and some thirty miles northward from Bethel to the plain of Esdraelon. It occupies the very centre of Palestine. The children of Ephraim and of Manasseh complained that the country allotted to them was not large enough. To this Joshua answered: "If thou be a great people, get thee up to the forest, and cut down for thyself there in the land of the Perizzites and of the Rephaim, since the hill-country of Ephraim is too narrow for thee." And the children of Joseph said: "The hill-country is not enough for us; and all the Canaanites that dwell in the land of the valley have chariots of iron, both they who are in Bethshean and its towns, and they who are in the valley of Jezreel." And Joshua answered Ephraim and Manasseh, saying, "Thou art a great people, and hast great power; thou shalt not have one lot only; but the hill-country shall be thine; for though it is a forest, thou shalt cut it down." (*Revised Version.*)

It seems impossible to put any interpretation upon this passage except that when the Israelites invaded Palestine the lowlands were cleared while the central highland was covered with an uninhabited forest, which the new-comers cleared just as the early American colonists, on a vastly larger scale, cleared what is now the eastern United States.

Authors such as Hilderscheid, Ankel, and Conder, however, who do not believe in changes of climate, lay much stress on the fact that the three Hebrew words translated "wood" or "forest" do not necessarily mean exactly what we mean by those terms. Conder (1876: 124) thus sets forth the meaning of the three words used in the Old Testament. The first, "choresh," "does not necessarily imply timber trees, but rather copse or underwood such as still exists." The second, "Jash," usually translated "forest," "might be rendered 'wilderness,' according to the old use of the word. This may be compared with the more dense thickets of lentisk and dwarf-oak, with occasional scattered pines in the high ground, which clothe the western slopes

of the hills. That the amount of this kind of growth has materially decreased and is still decreasing there is no doubt." The third word "etz," applies to timber trees, but does not of necessity mean forest, as it is often used for solitary trees. Conder concludes that "The character of the wooded growth is unchanged. The districts covered by 'wood' [in the sense of thick copse apparently] have on the whole materially decreased."

What Conder and the others say about the various words used for forests is interesting and important, but it gives no clew to the nature of the growth which the invading Israelites were obliged to clear away. The same word may be used in very different senses at different times, or even at one time. We use the word "woods" for a growth of giant trees a hundred feet high and also for a little grove of saplings twenty feet high. Writers on South America use the word "forest" in describing both the Amazon basin and the Gran Chaco farther south in Bolivia and northern Argentina. In the one case, the growth consists of magnificent trees growing so close together that their tops shut out all sunlight. In the other case, the country is covered with typical "savanna." The many ways in which the savanna of eastern Bolivia is described afford an excellent illustration of the variety of phrases which unscientific writers may apply to a mixed growth of trees, scrub and grass in a district which, like Palestine, has a wet and a dry season. "The most accurate descriptions," to quote Bowman, "picture an even stand of tropical and subtropical trees on the banks of the streams and in the adjacent flood-plains. On the much more extensive interfluvial areas the growth is mixed, only isolated trees occurring in wide stretches of open scrub and grass. A river traveller, seeing the forest growth lining the river-bank, gives a description far different from that of the cross-country traveller. The contrasting descriptions, when incorporated in the accounts of those who have never seen the country, are altered somewhat and become still more diverse. The result is a series of very different descriptions, ranging all the way from 'dense forests' to 'prairie.' Two travellers, even when writing of the same route through such a mixed growth, give quite different descriptions, one being impressed by the stream growth, the other by the absence of a continuous stand of trees over the wide interstream areas."

Leaving now the question of the nature of the forests or scrub, as the case may be, which occupied the mountains at the time of Joshua, it appears fairly certain that in its day of greatness Palestine was not a wooded country. Hilderscheid and Ankel point out

that if the population of the Holy Land was formerly so dense as is indicated by the facts stated in a preceding paragraph, it stands to reason that there can have been very little chance for forests, especially as the people were almost entirely agricultural. Whatever trees there may have been originally must have been largely cut off for local use. As Ankel (1887: 122) puts it in reference to the land west of Jordan where the children of Joseph were urged by Joshua to cut off the forest: "For the nearly 4,000 years of the historic past a diminution in the forests west of the Jordan is not proved. On the contrary, one can scarcely climb a mountain peak on which, among the wild bushes, one cannot find traces of old terraces for the location of vineyards and fig-gardens, or of grain-fields; or where there are not winepresses hewn out of the solid rock, banks of stones built up for threshing-floors, primitive cisterns, etc., witness of the industry of the former race which knew how to make even the barren ground fruitful. When these works were carried out it is hard to say; but at all events it was at a time when what one in Syria calls 'forests' were restricted to narrower limits than now."

Since forests were of such limited occurrence in the time of the greatest prosperity of Palestine, it is hardly to be supposed that they can have had much effect upon rainfall. It may be added that meteorologists find no ground for believing that forests ever have more than the very slightest effect upon the amount of rainfall, equivalent perhaps to an additional elevation of the land to the amount of one or two hundred feet. They undoubtedly have a vast influence upon the prosperity of a country, for they regulate the rapidity with which the rain runs off and thus prevent floods, ensure the permanence of springs and preserve the general moisture of the soil from one rain to another.

(3) ANCIENT ROUTES OF INVASION, MIGRATION AND TRADE—SINAI.—The works of ancient authors contain many accounts of routes of travel which were once much used, but are now abandoned for lack of water and pasture. One of the best known of such routes is that which leads from Palestine to Egypt through the northern part of Sinai. Three thousand years ago it was one of the most important routes in the world. Caravans moved back and forth along it with facility. At the time of the Jewish Patriarchs it was a common thing to go from Syria to Egypt on business. In later days a great commerce was carried on between Egypt, on the one hand, and Syria, Assyria, and Arabia, on the other, all of it passing easily across the peninsula of Sinai. Great armies also followed

the same route. We read again and again of how the Assyrians invaded Egypt or the Egyptians waged war in Syria. Alexander traversed the routes between Palestine and Egypt twice with ease.

To-day all is changed. Practically no one, except the scientific European traveller and a few Beduins, ever crosses the desert from Palestine to Egypt. From a commercial point of view the route is well-nigh impossible. There is so little water and grass that a few caravans would consume it all. If caravans like those of the palmy days of Assyria and Egypt should attempt the route most of their animals would perish. Where the great armies of the ancients marched and counter-marched time and again, the little army of Napoleon in 1799 was almost ruined on the way from St. Jean d'Acre to the Pelusian mouth of the Nile. The Assyrians probably knew somewhat more than the French about methods of travel in dry regions. Nevertheless, it is highly improbable that they can have experienced any such difficulties as those of Napoleon's army. If they had, they scarcely would have made so many expeditions against Egypt. That country could hardly have been so keen a rival of Syria, if the two lands had been separated by deserts so widely as is now the case.

In this same region, three thousand years or more before the days of Napoleon, the great hosts of the Israelites are said to have wandered for forty years on their way from Egypt to the Promised Land. Their number, it will be remembered, is given in the book of Numbers as over 600,000 warriors, besides women and children. The total thus amounts to between two and three million souls, together with all manner of flocks and beasts of burden. For years, so we are told, they wandered in Sinai, sometimes hungry and thirsty, but usually finding enough to eat and drink, both for themselves and their flocks. Time and again the migratory horde came into conflict with powerful tribes of aborigines, such as the Amalekites.

From the biblical account it appears that not only were the Israelites a vast horde, but the peninsula was well peopled. The number of permanent inhabitants must have far exceeded anything that is now possible. At present the total population amounts to only four or five thousand wretched Beduins. The neighbouring regions of the Tih and Arabia Petraea, where once the Edomites and Amorites dwelt, are no better peopled. Always, as Fraas (1878: 27) well says, the hungry Arabs are engaged in fights with one another for grazing grounds or for the scanty springs which alone make life possible. "In consequence of the visit of our caravan to

the camping place of the Beduins" he tells us, in speaking of the expedition of the Duc de Luynes, "the spring of Selaf was exhausted in three days. So the worthy Sheikh Nassar declared to us that dear as his guests were to him, yet before evening we must move our camp to some other place. His tribe already felt the lack of water. Now, in a land which becomes literally exhausted and eaten up through the invasion of only a thousand additional men, can Israel have halted for years? The numerous people of Israel would have used up the whole of the water of the present-day Sinai in a few days. They would have eaten up all the vegetation; and with that all further means of life would have been consumed, even if no native population had existed. Instead of this, we find that the various tribes accomplish their several parts in order; in battle they conquer the aborigines; and, certainly making use of all the wadis, approach as they have been directed to the central stock of the whole mountains, Jebel Horeb or Musa, where the law was announced in the great assembly of the people. Sinai must at that time have been a fruitful Alpine land in all the wadis; the mountains must have been covered with pasturage; to think of a desert like that of to-day is quite impossible. For the desert which the Scripture names one can only understand the salt steppes on the shore of the Red Sea, and to a certain extent also the rocky districts in the mountains, in which the water cannot gather and which therefore form tracts bare of vegetation. To-day the whole peninsula is a desert, and the points on the map where vegetation and the abode of man are indicated almost disappear. Without the assumption of a deep-seated alteration of climate, which has taken place in historic times, leaving out of account the prehistoric, the whole rich and significant story of Sinai remains an inexplicable riddle."

Fraas states the case strongly, but he takes no account of two serious objections which may be raised to his point of view. In the first place, large caravans do sometimes cross Sinai; and, in the second place, it is by no means certain that the Israelites were so numerous as is represented in the Bible, and there are even those who say that the whole story of the exodus is a mere legend. As to the first point, there is no question but that within a few decades large caravans of Mohammedan pilgrims went through Sinai from Egypt to Mecca. In some cases the number of pilgrims is said to have been about 5,000. Their status, however, was entirely different from that of the Israelites. The travellers were all men. They were bound for Mecca on the holy pilgrimage, and were ready and

able to endure hardships which would be absolutely deadly to a migratory horde like the Israelites encumbered with women, children, sheep, and all manner of impediments. Furthermore, the pilgrims merely passed across the peninsula by the shortest line, a distance of 160 miles, which could easily be traversed in ten days. To pass through a land rapidly on camel-back, carrying all necessary provisions, and animated by the hope of eternal salvation as the reward for a few days of hardship is one thing. For a vastly larger body of people to pass through the same land slowly, supporting themselves, their children and their cattle on the produce of the soil, and fighting with hostile aborigines is a wholly different matter.

By far the most serious objection to the conclusion of Fraas as to the former habitability of Sinai is found in the common contention that the biblical narrative is inaccurate. Year by year, however, this objection is losing its force, as discovery after discovery in the field of archæology or history confirms the essential accuracy of the Bible. It may be admitted that many or even most of the details as to the wanderings of the Israelites are inaccurate and that there is much exaggeration. It can scarcely be denied, however, that the story has an historical basis, and that a large body of people, the ancestors of the Jews, came out of the regions known as Sinai, the Tih, and Arabia Petræa and invaded the fertile land of Palestine. The number of invaders may have been multiplied tenfold or twentyfold, but it must have been large. The time of the wanderings may have been ten years or a hundred. All this is immaterial.

The essential fact is that a large body of nomads, starting from Egypt, traversed the Sinaitic peninsula and Arabia Petræa, and finally invaded Palestine. They suffered some hardships, but not a tithe of what any similar body of people would suffer now. They met a large number of inhabitants during the course of their journey, far more than would be met with to-day. The country was then much more densely populated than now, as appears from the abundant ruins of cisterns, terraced fields, houses, villages, and cities upon which every traveller expatiates. The whole agglomeration of circumstances is eminently consistent with the existence of more favorable natural conditions in the past than in the present. It is eminently inconsistent with the present conditions.

In this connection another point needs emphasis. The writers of the biblical narrative and of other ancient documents lived near Sinai; they were familiar with it personally or from the accounts of contemporaries who had traversed the region on business or pleas-

ure. They wrote for men who knew the places mentioned. Under such conditions they could not have falsified their accounts as some modern critics would have us believe. They must have described the country as they and their contemporaries knew it to be. Every modern traveller, almost, has much to say of the hardships of travel in Sinai, and of the impossibility of its supporting multitudes of people. The ancient writers say almost nothing of this. We can scarcely suppose that they were fools or knaves, and therefore we must believe that they described things approximately as they were.

THE SYRIAN DESERT.—The arguments which apply to Sinai apply with equal or greater force to the great Syrian desert. Livingstone (*Last Journals*: 270) speaks of the great armies which crossed the desert. They apparently did not follow the roundabout route through Aleppo, as most modern caravans do. To-day any other line of march would entail the greatest suffering, but such does not seem to have been the case in the past. At the time of the captivities of Israel prisoners were many times carried to Babylonia, and the route which they followed was apparently across what is now the desert. On this point Livingstone makes a sensible comment. "The prophets," he says, "in telling all the woes and miseries of the captivities, never allude to suffering or perishing by thirst on the way. Had the route to Assyria been then as it is now, they could scarcely have avoided referring to the thirst on the way; but everything else is mentioned except that."

One of the most remarkable features of the commerce of the world during the Roman period and earlier was the great proportion of it conducted in regions where there is now no commerce because the country is too dry. It is beyond the scope of this paper to enlarge on the ancient commerce of Arabia, or to investigate the peculiar fact that Ptolemy describes five rivers there, although now there is not one. The commerce across the Syrian desert, however, was closely connected with Palestine. Up to the end of the first century of the Christian era, the city of Petra, now a magnificent ruin in the midst of the desert, was a great emporium of trade. "Petra," to quote the *Encyclopædia Britannica*, "was not only safe and well-watered; it lay close to the most important lines of trade. The modern pilgrim road from Damascus to Mecca, which has taken the place of the old incense-route, passes indeed a little to the east by Ma'an. But to touch Petra involves no great detour even on this line, and in ancient times, when Gaza was the great terminus of the Arabian trade, Petra was the place where the Gaza road branched off from that to Bosra, Palmyra and northern Syria. The

route from Egypt to Damascus is also commanded by Petra, and from it too there went a great route direct through the desert to the head of the Persian Gulf. Thus Petra became a centre for all the main lines of overland trade between the East and the West, and it was not till the fall of the Nabatæan kingdom that Palmyra superseded it as the chief emporium of north Arabia."

It is needless to say that all these routes are to-day abandoned. Along the ancient road from Petra to the head of the Gulf of Akaba there are abundant ruins of towns and caravan-serais. Strabo says that in his day, when many Romans were numbered among the inhabitants of the prosperous city of Petra, there was a large mart called Leuce-Come on the east side of the Red Sea near its northern end. To this place, he says, "the camel-traders travel with ease and safety from Petra, and back again, with so large a body of men and camels as to differ in no respect from an army." At present the whole region is desert, the only water is a few poor little springs, and the only inhabitants are Beduin.

Even more remarkable than the road southward from Petra is the one eastward across the Syrian desert to the head of the Persian Gulf. To-day no caravan can possibly cross this desert waste seven or eight hundred miles wide. No explorer, even, appears to have made the journey. The distances from water to water are so great as absolutely to preclude the use of this route. Yet in the past it is spoken of as a great line of trade. Here the work of man can have had little or no effect; nature, not man, appears to have caused the change.

Other routes present the same phenomenon, although in less striking fashion. For instance, there was formerly a great route eastward across the desert from Bosra, although here, too, the desert is now impassable. Even the northern route through Palmyra is to-day largely abandoned. It can, however, still be used in favorable seasons. It is noticeable that the abandonment of the various routes has proceeded regularly from south to north, from the more desert to the less desert regions. Many reasons are assigned for the abandonment of the successive routes. For instance, it is commonly said that the commerce of Petra fell off during the first century of the Christian era because of the establishment of a route from Myos Hormos on the Red Sea to Coptos on the Upper Nile. It is quite as probable that the new route was established because the routes converging at Petra were becoming so dry that caravans began to suffer.

(To be continued.)